Project Planning Report for a Program of Utilities Infrastructure Renewal Projects for the St. George Campus

I Background Information

The constant increase of research activities and academic growth on campus has put a strain on the existing electrical distribution system that supports both the laboratories themselves and the heating and cooling systems needed to keep them operating. In May 2008, a report to the Planning and Budget Committee (which was eventually approved at Governing Council) noted that the southeast quadrant of the campus urgently needed new power sources. That first report concentrated on re-feeding the Wallberg Building from Toronto Hydro, a project which is now complete. It also noted that a subsequent plan would be drafted to address the same issue at the Medical Sciences Building.

The Medical Sciences Building contains a central chiller plant serving 15 surrounding buildings including the Terrence Donnelly Centre for Cellular Bio-molecular Research, the Leslie Dan Pharmacy Building, the Tanz Neuroscience Building, the Fitzgerald Building and other academic and administrative buildings. The portfolio of facilities served by this plant has grown without always a corresponding increase in production capacity. During the past two summers during periods of high heat and humidity, the chillers have not been able to keep up with the cooling requirements of the area, resulting in warmer, more humid space conditions. While this may be an acceptable and understandable situation during heat waves in other functional type buildings, it is not acceptable in laboratory buildings which specialize in medical research. Therefore, another chiller will need to be added to the Medical Sciences central plant to correct this problem.

Unfortunately, a new chiller cannot simply be added to the existing system as it now stands. Spare electrical capacity is not available at the Medical Sciences Building. At the same time, spare electrical capacity is now unavailable in both the Sandford Fleming Building and the Galbraith Building. In fact, the electrical feeder loop that supplies the south east area of the campus is already overloaded. Should there be a failure of any segment of the loop the normal procedure is to feed power to a building in the reverse direction, bypassing the failed segment. This allows the power to be quickly restored through simple switching. As it stands now, a feeder failure would necessitate load shedding in order to partially supply the buildings while a full repair is implemented.

In addition, building projects either now in the planning or construction stage such as the Rotman expansion or on the horizon such as the developments at Site #12 will tax the remaining spare steam production capacity requiring improvements to be made in order that these facilities may be fed from the efficient district energy system that the University has developed.

II. Impact on the Academic Plan

Failure to deal with the capacity shortage of heating, cooling and electricity would mean that certain new buildings would not benefit from efficiencies inherent in district energy systems, and existing facilities with expanding programs would not be served adequately. If power is not re-supplied to Medical Sciences, the growing research program in the southeast quadrant of the campus can not be accommodated and the southeast area would suffer from inadequate cooling capacity. New buildings projected for the area like Enabling Technologies in the longer term would have to have their own local cooling systems instead of being able to connect to a centralized system which saves equipment costs and valuable floor area in the buildings.

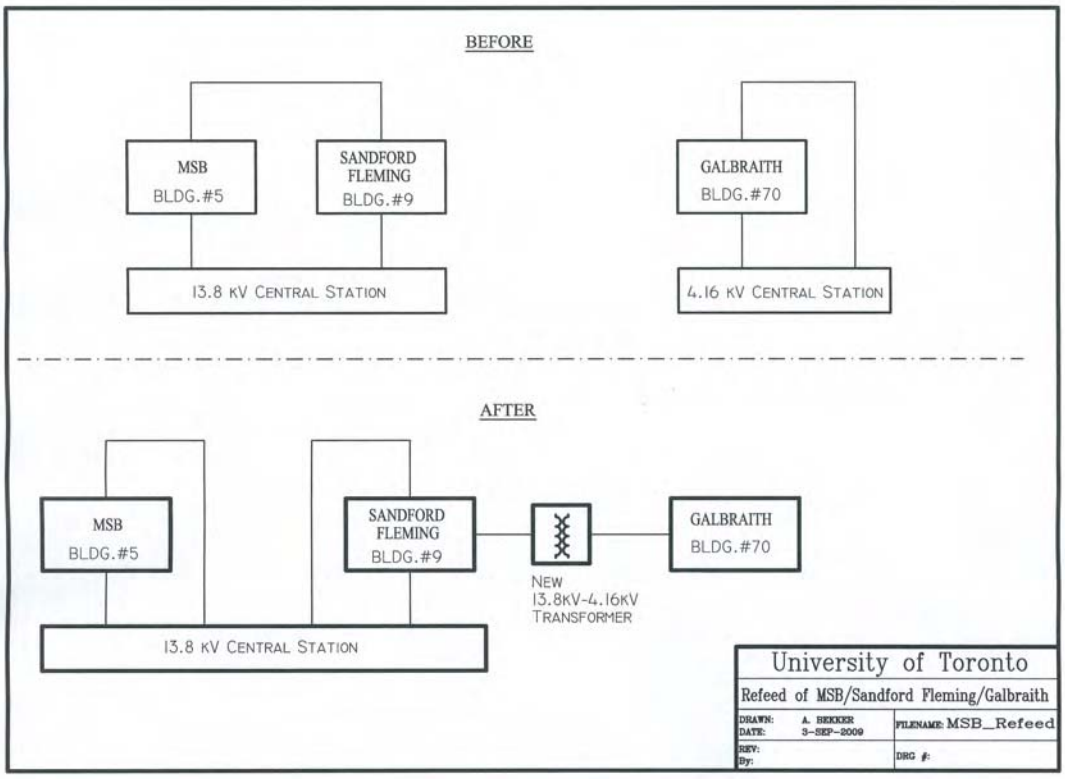
III. Project Description

(a) New electrical feed to Medical Sciences, Sandford Fleming and Galbraith buildings

The Medical Sciences Building and the Sandford Fleming Building are both fed from Loop 1 on the 13,800 volt system. The Galbraith Building is fed from Loop 6 on the 4,160 volt system. A plan has been proposed to re-feed the Medical Sciences Building with a new 13,800 volt feeder in a new buried duct bank from the central station at Russell Street. This will provide the Medical Sciences Building with full capacity from the loop feeders without de-rating due to heat build-up in the ducts. The Galbraith Building will then be re-fed from the Sandford Fleming Building which is fed from the existing 13.8kV loop feeders.

The capacity available at the University's central station is the result of re-feeding certain large buildings such as the Bahen Centre for Information Technology and the Wallberg/Pratt Building directly from Toronto Hydro to deal with shortfalls on the distribution feeder system.

The implementation of this plan will entail burying a 13.8 kV duct bank from Russell and Huron, across St. George Street to the Medical Sciences Building to create a new loop. Sandford Fleming will remain in the existing loop and sub-feed the Galbraith Building. Since the Galbraith Building has been fed at a different voltage until now, a new substation with new transformers would have to be located there, requiring an allocation of space and re-work of the building components. Re-work of the feeders and high voltage equipment at the Sandford Fleming end of the system would also have to take place. Allocation of space and re-work of the high voltage switchboard is required to accommodate additional switchgear in order to sub-feed Galbraith's other loads.


BEFORE
MSB
BLDG.#5
SANDFORD
FLEMING
BLDG.#9
13.8 kV Central Station
GALBRAITH
BLDG.#70
4.16 kV Central Station
AFTER
MSB
BLDG.#5
SANDFORD
FLEMING
BLDG.#9
NEW
13.8kV-4.16kV
TRANSFORMER
GALBRAITH
BLDG.#70
13.8 kV Central Station
University of Toronto
Refeed of MSB/Sandford Fleming/Galbraith
DRAWN: A. HEKKER
DATE: 3-SEP-2009
FILENAME: MSB_Refeed
REV:
By:
DRG #:

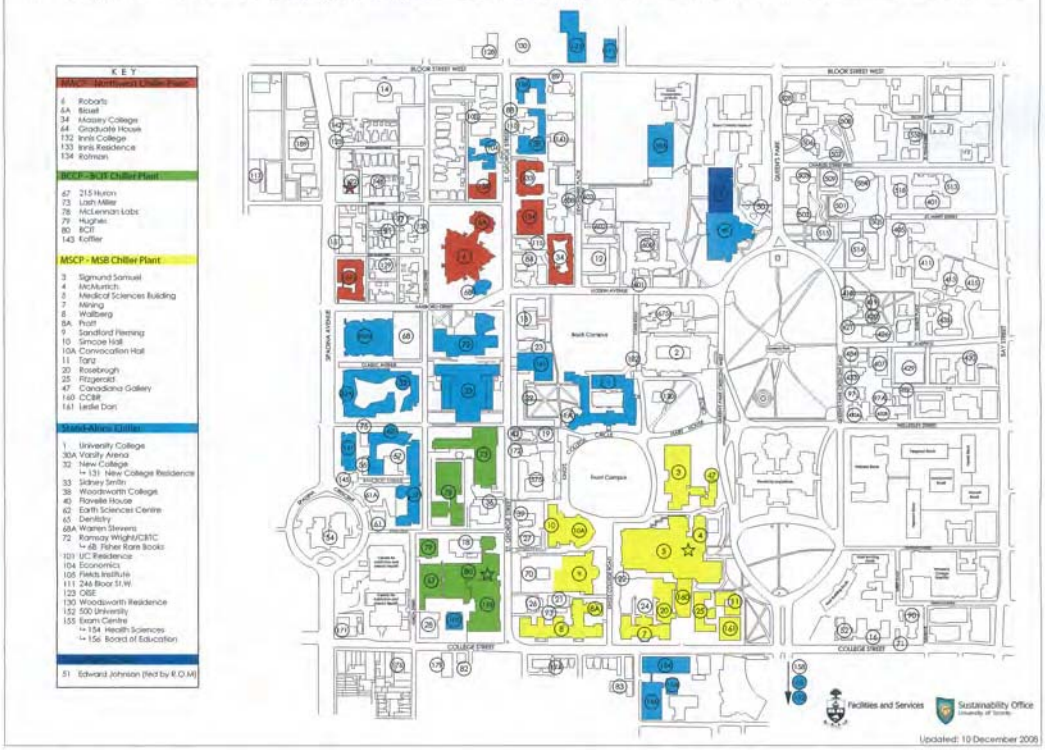
(b) New chiller for the southeast quadrant of campus

The chiller plant housed in the Medical Sciences Building feeds chilled water for air conditioning to 15 buildings in the area (Gerstein, Canadiana, McMurrich, Tanz, Leslie Dan Pharmacy, Fitzgerald, CCBR, Rosebrugh, Mining, Wallberg, Pratt, Sandford Fleming, Simcoe Hall, Convocation Hall and MSB). Loads from steadily growing research, academic and administrative activities in many of these buildings have increased to the point where it is not possible to maintain proper cooling and de-humidification in many of the facilities during hot periods of the summer. It is inevitable that this trend will continue, putting critical research at risk – there is now no effective standby capacity to cover potential breakdowns of equipment.

It is proposed to augment the capacity in the plant with a new 2,500 Rton chiller. There is sufficient space in the MSB chiller room for this equipment. As well, cooling tower and pumping capacity will be augmented.

It is important to note that this project can only be initiated if the companion project – the electrical re-feed of MSB, Sandford Fleming and Galbraith – is completed.

University of Toronto - St. George Campus: Central Chiller Plant Distribution and Stand-Alone Chillers



Updated: 10 December 2008

(c) Increasing heat production at the Central Steam Plant

The Central Steam Plant on Russell Street provides heat to 85% of campus buildings as well as the Trinity, St. Michael's and Victoria College campuses. The plant consists of 4 large boilers as well as a waste heat boiler that uses heat from the cogeneration operation and a direct contact heat recovery system that further gleans heat from the exhaust gases that would otherwise be wasted up the chimney. While the total capacity of this equipment is sufficient to heat the space planned for development on campus, various bottlenecks in the system such as the capacity to produce treated feed water, and the limited quantity of oil we have as a standby fuel for periods when natural gas is not available prevent the full boiler capacity from being used.

While the heat distribution system returns more than 90% of its condensate to the plant conserving the residual heat, this water must be processed in a de-aerator. The existing equipment is operating at its maximum. The water treatment facility must be expanded to allow additional boiler capacity to be exploited.

The Technical Standards and Safety Authority has indicated that the 405,000 litre underground concrete oil storage tanks that serves the plant will no longer be acceptable in its current form. This problem can be solved by installing independent metal or plastic tanks inside the concrete vault of the old tanks. This will allow us to keep sufficient oil stored on site to cover periods when natural gas is not available, either from an emergency in the system, or when Enbridge exercises its right to curtail the gas supply as part of the terms of the lucrative interruptible contract that saves the University about $1 million per year.

IV. Special Considerations

Landscaping

Routing cable under university roads and paved or landscaped areas must be performed by tunneling or open cut excavations with restoration of the area to the original condition included in the project.

V. Resource Implications

Capital cost estimate

The Total Project Cost Estimate for this program of projects can be summarized as:

Re-feed power to Medical Sciences, Sandford Fleming and Galbraith	5,000,000
Additional chiller in southeast chiller plant	3,550,000
Increase steam plant capacity	2,600,000
Construction financing	82,000
Total	$11,232,000

(See Appendix A for detailed breakdown)

Operating Costs

Increased power and natural gas costs will be incurred by the University as a result of the research performed in new labs and buildings and will be captured in the reports for those facilities.

VI. Funding Sources

Required funds will be obtained by borrowing internally for a period of 25 years with the principal and interest paid from the annual utilities budget. The cost of the annual principal and interest payments would be added to the central utilities budget and spread equitably across the St. George divisions in accordance with the new budget model. In addition, an annual contribution of $1,000,000 will be made in each of the first five years from the utilities infrastructure renewal reserve fund.

Should there be surpluses available in the central utilities budget due to energy purchases less than budget, these surpluses will be put towards paying down the principal.

Assuming current interest rates for a loan with a 25 year term, payments will be $720,000 per year.

VII. Schedule

The increased capacity provided by this work is required as soon as possible in order to allow certain research initiatives to proceed without inconvenient scheduling of academic activities to prevent overloads. It is proposed that the chiller project be initiated after the start of the electrical re-feed project in order to provide the required lead time.

A proposed project schedule is attached as Appendix B.

VIII. Recommendations

It is recommended that the Planning and Budget Committee recommend to the Academic Board:

- THAT the Utilities Infrastructure Renewal program of projects be approved, at a total cost not to exceed $11.232 million, with funding as follows:
    - $5 million from utilities infrastructure renewal funds and the balance a loan to be repaid by increasing the annual utilities budget by $720,000.

Appendices:

A. Total Project Costs Estimates
B. Project timeline

APPENDIX A

Total project cost estimates

PROJECT COST ESTIMATE **PROJECT: Increased steam capacity at CSP**

PROJECT MGR: **U OF T PROJECT NO:**

NO	ITEM	REMARKS		BASE COST	GST(1.65%)	COST
CONSTRUCTION						
835730	Main contract			$950,000	$15,675	$965,675
835752	Other contract			$0	$0	$0
835754	Secondary effects			$0	$0	$0
835757	Construction Contingency		10%	$95,000	$1,568	$96,568
835762	Hazardous materials removal			$15,000	$248	$15,248
835765	Demolition			$100,000	$1,650	$101,650
835768	Site preparation			$0	$0	$0
	Total Construction					$1,179,140
LANDSCAPING						
835755	Landscaping			$0	$0	$0
	Total Landscaping					$0
PERMITS, INSURANCE						
835400	Permits	TSSA		$5,000	$83	$5,083
836700	Insurance			$0	$0	$0
	Total Permits, Insurance					$5,083
PROFESSIONAL FEES						
835200	Consultants: -Architects, Engineers			$100,000	$1,650	$101,650
835201	Consultants - disbursements			$0	$0	$0
835204	Construction management fees			$75,000	$1,238	$76,238
835206	Other consultants			$0	$0	$0
835210	Legal fees			$0	$0	$0
835720	Design fees-In House			$0	$0	$0
835721	External Project Manager			$0	$0	$0
835725	Management fees-Capital Projects		3.50%	$40,600	$0	$40,600
	Total Professional fees					$218,488
SERVICES TO SITE						
835700	Site services & infrastructure			$25,000	$413	$25,413
	Total Site Services					$25,413
COMPUTER WIRING AND TELEPHONES						
821110	Computer infrastructure			$0	$0	$0
835010	Telephone			$0	$0	$0
	Total Computer Wiring & Telephones					$0
MOVING AND STAGING						
837100	Moving			$0	$0	$0
837101	Staging			$0	$0	$0
	Total Moving and Staging					$0
FURNISHINGS AND EQUIPMENT						
820010	Furnishings			$0	$0	$0
821010	Equipment			$0	$0	$0
821510	AV for classrooms			$0	$0	$0
821610	Scientific Equipment	GST is not applicable		$0	$0	$0
	Total Furnishings and Equipment					$0
OTHER						
820011	Signage-Interior			$0	$0	$0
821325	Security & Access systems			$0	$0	$0
835070	Courier, misc.			$0	$0	$0
835756	Signage-Exterior			$0	$0	$0
835764	Client Construction expenses			$0	$0	$0
835766	Ceremonies	Ground breaking, Top off, Grand opening		$0	$0	$0
835900	Advertising			$0	$0	$0
836430	Donor recognition			$0	$0	$0
890670	U of T Trades			$30,000	$0	$30,000
	Total Other					$30,000
		SUB TOTAL				$1,458,123
PROJECT CONTINGENCY						
835758	Project Contingency			$0	$0	$0
	Total Project Contingency					$0
FINANCE COSTS						
835300	Finance Costs			$0	$0	$0
	Total Finance Costs					$0
		TOTAL PROJECT COST:				$1,458,123

Prepared by: Recommended by: Approved by:

Date: Date: Date:

PROJECT COST ESTIMATE **PROJECT: Underground oil tank replacement**

PROJECT MGR: **U OF T PROJECT NO:**

NO	ITEM	REMARKS		BASE COST	GST(1.65%)	COST
CONSTRUCTION						
835730	Main contract			$750,000	$12,375	$762,375
835752	Other contract	oil contamination testing		$75,000	$1,238	$76,238
835754	Secondary effects			$0	$0	$0
835757	Construction Contingency		10%	$75,000	$1,238	$76,238
835762	Hazardous materials removal			$5,000	$83	$5,083
835765	Demolition			$80,000	$1,320	$81,320
835768	Site preparation			$15,000	$248	$15,248
	Total Construction					$1,016,500
LANDSCAPING						
835755	Landscaping			$0	$0	$0
	Total Landscaping					$0
PERMITS, INSURANCE						
835400	Permits			$10,000	$165	$10,165
836700	Insurance			$0	$0	$0
	Total Permits, Insurance					$10,165
PROFESSIONAL FEES						
835200	Consultants: -Architects, Engineers			$55,000	$908	$55,908
835201	Consultants - disbursements			$5,000	$83	$5,083
835204	Construction management fees			$0	$0	$0
835206	Other consultants			$0	$0	$0
835210	Legal fees			$0	$0	$0
835720	Design fees-In House			$0	$0	$0
835721	External Project Manager			$0	$0	$0
835725	Management fees-Capital Projects		3.50%	$35,000	$0	$35,000
	Total Professional fees					$95,990
SERVICES TO SITE						
835700	Site services & infrastructure			$0	$0	$0
	Total Site Services					$0
COMPUTER WIRING AND TELEPHONES						
821110	Computer infrastructure			$0	$0	$0
835010	Telephone			$0	$0	$0
	Total Computer Wiring & Telephones					$0
MOVING AND STAGING						
837100	Moving			$0	$0	$0
837101	Staging			$0	$0	$0
	Total Moving and Staging					$0
FURNISHINGS AND EQUIPMENT						
820010	Furnishings			$0	$0	$0
821010	Equipment			$0	$0	$0
821510	AV for classrooms			$0	$0	$0
821610	Scientific Equipment	GST is not applicable		$0	$0	$0
	Total Furnishings and Equipment					$0
OTHER						
820011	Signage-Interior			$0	$0	$0
821325	Security & Access systems			$0	$0	$0
835070	Courier, misc.			$0	$0	$0
835756	Signage-Exterior			$0	$0	$0
835764	Client Construction expenses			$0	$0	$0
835766	Ceremonies	Ground breaking, Top off, Grand opening		$0	$0	$0
835900	Advertising			$0	$0	$0
836430	Donor recognition			$0	$0	$0
890670	U of T Trades			$15,000	$0	$15,000
	Total Other					$15,000
		SUB TOTAL				$1,137,655
PROJECT CONTINGENCY						
835758	Project Contingency			$0	$0	$0
	Total Project Contingency					$0
FINANCE COSTS						
835300	Finance Costs			$0	$0	$0
	Total Finance Costs					$0
		TOTAL PROJECT COST:				$1,137,655

Prepared by: Recommended by: Approved by:

Date: Date: Date:

PROJECT COST ESTIMATE **PROJECT: Additional chiller and cooling tower in SE chiller plant**

PROJECT MGR: **U OF T PROJECT NO:**

NO	ITEM	REMARKS	BASE COST	GST(1.67%)	COST
CONSTRUCTION					
835730	Main contract		$0	$0	$2,800,000
835752	Other contract		$0	$0	$0
835754	Secondary effects		$0	$0	$0
835757	Construction Contingency	10%	$0	$0	$280,000
835762	Hazardous materials removal		$0	$0	$70,000
835765	Demolition		$0	$0	$0
835768	Site preparation		$0	$0	$0
	Total Construction				$3,150,000
LANDSCAPING					
835755	Landscaping		$0	$0	$0
	Total Landscaping				$0
PERMITS, INSURANCE					
835400	Permits		$0	$0	$0
836700	Insurance		$0	$0	$0
	Total Permits, Insurance				$0
PROFESSIONAL FEES					
835200	Consultants: -Architects, Engineer	10%	$0	$0	$280,000
835201	Consultants - disbursements		$0	$0	$0
835204	Construction management fees		$0	$0	$0
835206	Other consultants		$0	$0	$0
835210	Legal fees		$0	$0	$0
835720	Design fees-In House		$0	$0	$0
835721	External Project Manager		$0	$0	$0
835725	Management fees-Capital Projects	3.50%	$0	$0	$110,250
	Total Professional fees				$390,250
SERVICES TO SITE					
835700	Site services & infrastructure		$0	$0	$0
	Total Site Services				$0
COMPUTER WIRING AND TELEPHONES					
821110	Computer infrastructure		$0	$0	$0
835010	Telephone		$0	$0	$0
	Total Computer Wiring & Telephones				$0
MOVING AND STAGING					
837100	Moving		$0	$0	$0
837101	Staging		$0	$0	$0
	Total Moving and Staging				$0
FURNISHINGS AND EQUIPMENT					
820010	Furnishings		$0	$0	$0
821010	Equipment		$0	$0	$0
821510	AV for classrooms		$0	$0	$0
821610	Scientific Equipment	GST is not applicable	$0	$0	$0
	Total Furnishings and Equipment				$0
OTHER					
820011	Signage-Interior		$0	$0	$0
821325	Security & Access systems		$0	$0	$0
835070	Courier, misc.		$0	$0	$0
835756	Signage-Exterior		$0	$0	$0
835764	Client Construction expenses		$0	$0	$0
835766	Ceremonies	Ground breaking, Top off, Grand opening	$0	$0	$0
835900	Advertising		$0	$0	$0
836430	Donor recognition		$0	$0	$0
890670	U of T Trades		$0	$0	$10,000
	Total Other				$10,000
		SUB TOTAL			$3,550,250
PROJECT CONTINGENCY					
835758	Project Contingency		$0	$0	$0
	Total Project Contingency				$0
FINANCE COSTS					
835300	Finance Costs		$0	$0	$0
	Total Finance Costs				$0
		TOTAL PROJECT COST:			$3,550,250

Prepared by: Recommended by: Approved by:

Date: Date: Date:

Facilities and Services
TOTAL PROJECT COST (TPC)
[Preliminary]

PROJECT NUMBER:
PROJECT NAME: Re-feed power to S.Fleming, Galbraith & Medical Sciences

PROJECT MANAGER:
CAMPUS: St. George
PROJECT DURATION:

Number	Item	Remarks	Base Cost	GST (1.65%)	Cost
CONSTRUCTION					
835730	Construction: Main Contract		3,523,600	58,139	3,581,739
835752	Construction: Other Contract	Space for substation in Galbraith	150,000	2,475	152,475
835754	Secondary Effects			-	-
835757	Construction Contingency		352,360	5,814	358,174
835762	Hazardous Waste Removal		50,000	825	50,825
835765	Demolition Services		-	-	-
835768	Site Preparation			-	-
				Total Construction	***$4,143,213***
LANDSCAPING					
835755	Landscaping Services		-	-	-
				Total Landscaping	***$0***
PERMITS, INSURANCE					
835400	Licences / Permits		-	-	-
836700	Insurance	Calculated at 0.30% of Main Contract	10,571	174	10,745
				Total Permits, Insurance	***$10,745***
PROFESSIONAL FEES					
835200	Consulting	12%	465,115	7,674	472,790
835201	Consultants: Disbursements			-	-
835204	Construction Management Fees			-	-
835206	Other Consultants			-	-
835210	Legal Services		-	-	-
835721	External Project Manager		-	-	-
895720	Design Fees: In House		-	-	-
895721	Design: Disbursements	Meals, parking, mileage, printing	-	-	-
835723	Project Disbursements	Meals, parking, mileage, printing		-	-
895725	Project Management: Fees	3.50%	146,159	-	146,159
				Total Professional Fees	***$618,948***
SERVICES TO SITE					
835700	Site Services and Infrastructure	City charges	100,000	1,650	101,650
				Total Site Services	***$101,650***
COMPUTER WIRING AND TELEPHONES					
821110	Equipment: Computing: Purchase	Computing & Network Services	-	-	-
835010	Telephone Line Service		-	-	-
				Total Computer Wiring & Telephones	***$0***
MOVING AND STAGING					
837100	Moving		-	-	-
837101	Staging		-	-	-
				Total Moving and Staging	***$0***
FURNISHINGS AND EQUIPMENT					
820010	Furniture: Purchase		-	-	-
821010	Equipment: Purchase		-	-	-
821510	Equipment: Audio / Visual: Purchase		-	-	-
821610	Equipment: Research: Purchase	PST is not applicable	-	-	-
				Total Furnishings and Equipment	***$0***
OTHERS					
820011	Interior Signage: Purchase / Design	Included in Main Contract	-	-	-
821325	Security and Access Systems	Included in Main Contract	-	-	-
835070	Courier			-	-
835756	Exterior Signage: Purchase / Design	Included in Main Contract		-	-
835764	Client Construction Expenses			-	-
835766	Ceremonies	Ground breaking, top off, grand opening		-	-
835900	Advertising / Marketing			-	-
836430	Donor Recognition	Plaques		-	-
890670	Facilities Repair/ Renovation: Internal	Trades Incl. Fire-Utilities-Consultant		-	-
				Total Others	***$0***
				SUB TOTAL:	**$4,874,557**
PROJECT CONTINGENCY					
835758	Project Contingency		121,864	-	121,864
				Total Project Contingency	***$121,864***
FINANCE COSTS					
835305	Interest Charges	Excluded	-	-	-
				Total Finance Costs	***$0***
				TOTAL PROJECT COST:	**$4,996,421**

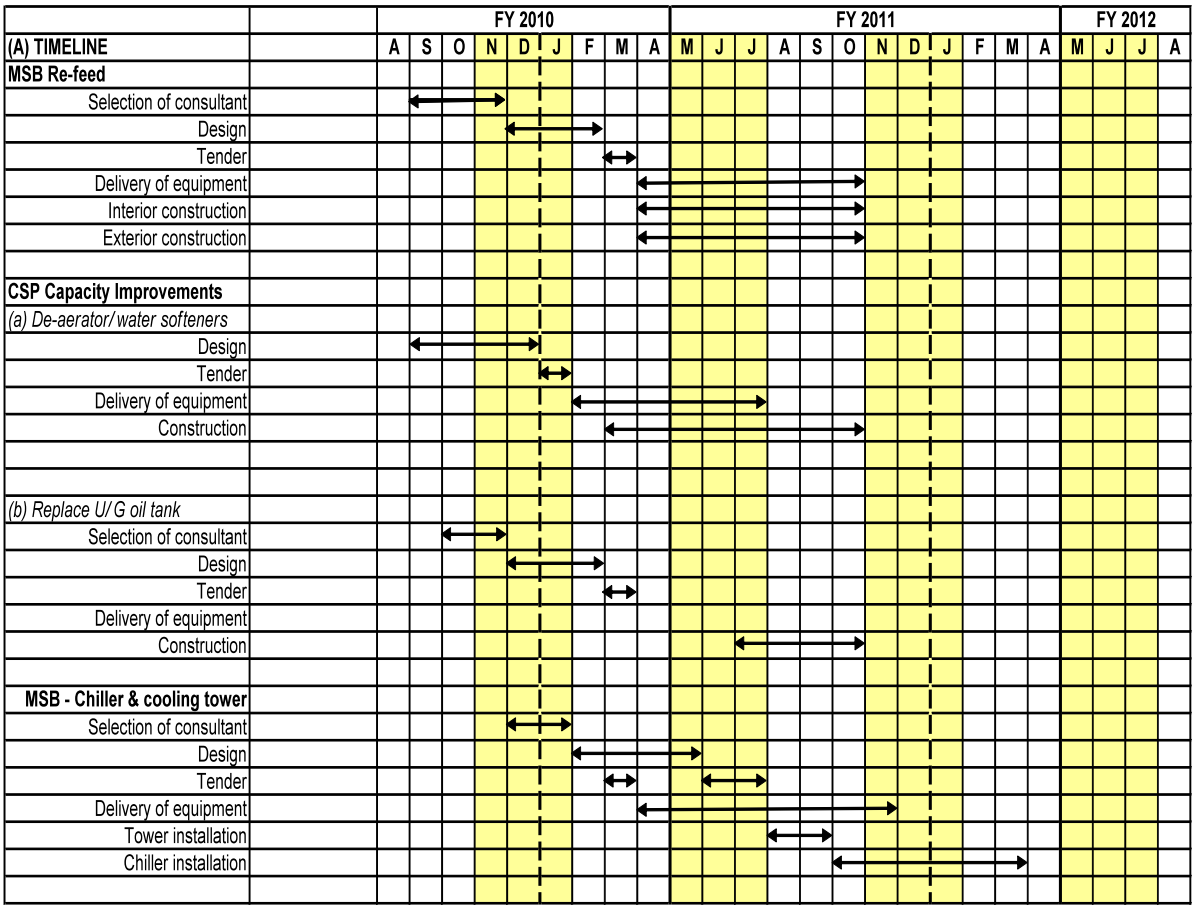
Project Management Fees
$146,159 **Updated Jan 07, 2008**

Recommended by:
10/22/2009 22:46

Approved by:
Date:

APPENDIX B

Project timeline


FY 2010
FY 2011
FY 2012
(A) TIMELINE
A S O N D J F M A M J J A S O N D J F M A M J J A
MSB Re-feed
Selection of consultant
Design
Tender
Delivery of equipment
Interior construction
Exterior construction
CSP Capacity Improvements
(a) De-aerator/water softeners
Design
Tender
Delivery of equipment
Construction
(b) Replace U/G oil tank
Selection of consultant
Design
Tender
Delivery of equipment
Construction
MSB - Chiller & cooling tower
Selection of consultant
Design
Tender
Delivery of equipment
Tower installation
Chiller installation